

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re: Yamauchi et al.
Serial No.: To be assigned
Filed: Concurrently herewith
Title: *PCB DECOMPOSITION REACTOR*

Date: October 10, 2001

Commissioner for Patents
Washington, D.C. 20231

PRELIMINARY AMENDMENT

Sir:

Prior to the examination of the above-captioned application and the calculation of the filing fee, please enter the following amendment. Attached hereto is a marked up version of the changes made to the specification and claims by the current amendment. The marked up version of the changes to the specification and claims is captioned "Version With Markings To Show Changes Made".

In the Specification:

On page 1, line 1, please insert the following:

-- Cross-Reference to Related Applications

The present application is a continuation application of Serial No. 09/266,388 filed March 11, 1999, allowed, the disclosure of which is incorporated herein by reference in its entirety. --

On page 2, lines 9-18, please delete the paragraph and insert the following paragraph:

-- When the PCB decomposition reactor having the above-described construction is operated, reaction vessel 21 is supplied with water at 250 kgf/cm² and 380°C, and also with PCB, mineral oil and sodium carbonate. Circulating pump 26 serves to agitate the reaction fluid within reaction vessel

21, and also introduce the reactant mixture 22 of water, PCB, mineral oil and sodium carbonate having a temperature of 200 to 250°C from the outside into reaction vessel 21 by mixing it with the steam of the fluid driven by circulating pump 26. This mixture 22 undergoes an exothermic reaction within reaction vessel 21 and causes sodium carbonate to precipitate. --

On page 3, line 21 to page 4, line 10, please delete the paragraph and insert therefore the following new paragraph:

-- A circulating pump which can be used under high-pressure temperature and high-pressure conditions (e.g., at 380°C and 250 kgf/cm²) is expensive and hence raises the overall equipment cost. Since the combustion rate of oil in a liquid is high, the reactant mixture fed through the feed pipe reacts with oxygen dissolved in water and causes heat evolution in the feed pipe. If sodium carbonate alone is supplied, the sodium carbonate produced by the oxidation reaction is converted into sodium bicarbonate, resulting in a reduction in the rate of the decomposition reaction of PCB. If sodium carbonate is introduced into the reaction fluid, the solubility of oxygen is reduced and a gas phase is produced at the top of the reaction vessel. This causes a mixed gas-liquid phase to flow into the cyclone separator, resulting in a reduction in the separation efficiency of the cyclone separator. --

On page 7, line 25 to page 8, line 16, please delete the paragraph and insert therefore the following new paragraph:

-- If an electrolytically dissociating solute such as sodium carbonate is dissolved in water, a rise in critical point is observed. When a fluid in which the above-described reaction is occurring is placed in a vessel having a fixed volume, the relationship between the pressure and temperature thereof is shown in FIG. 2. In the case of water, the rate of increase in pressure with rising temperature is augmented at a critical point characterized by 225.56 kgf/cm² and 374.15°C. However, such an increase in pressure is not

observed in the case of the aforesaid reaction fluid, suggesting that it remains in the form of pressurized water even beyond the critical point. Since PCB is decomposed at a temperature in the range of 370 to 400°C, the pressure required therefor is in the range of 225 to 310 kgf/cm². Moreover, the formed sodium carbonate has low solubility at temperatures above 370°C and hence precipitates within the reaction vessel in the form of solid particles. --

In the Claims:

Please cancel Claims 1-9 without prejudice.

Please amend the following claims.

10. (Amended) A PCB decomposition reactor comprising a reaction vessel for decomposing PCB therein and a feed pipe for feeding PCB and a solvent therefore to said reaction vessel, wherein an injector for injecting water and sodium hydroxide from the outside to the inside of said reaction vessel is connected to said reaction vessel, and said feed pipe is connected to the flow path between the connected end of said injector and the suction port of said injector for supplying water and sodium hydroxide therethrough, wherein a nozzle for introducing air in order to agitate the reaction fluid within said reaction vessel is connected to the bottom of said reaction vessel.

11. (Amended) A PCB decomposition reactor comprising a reaction vessel for decomposing PCB therein and a feed pipe for feeding PCB and a solvent therefore to said reaction vessel, wherein an injector for injecting water and sodium hydroxide from the outside to the inside of said reaction vessel is connected to said reaction vessel, and said feed pipe is connected to the flow path between the connected end of said injector and the suction port of said injector for supplying water and sodium hydroxide therethrough, wherein a nozzle for introducing oxygen in order to agitate the reaction fluid within said reaction vessel is connected to the bottom of said reaction vessel.

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12. (Amended) A PCB decomposition reactor comprising a reaction vessel for decomposing PCB therein and a feed pipe for feeding PCB and a solvent therefore to said reaction vessel, wherein an injector for injecting water and sodium hydroxide from the outside to the inside of said reaction vessel is connected to said reaction vessel, and said feed pipe is connected to the flow path between the connected end of said injector and the suction port of said injector for supplying water and sodium hydroxide therethrough, wherein a nozzle for introducing air and oxygen in order to agitate the reaction fluid within said reaction vessel is connected to the bottom of said reaction vessel.

Remarks

The present application is a continuation application of Serial No. 09/266,388 filed March 11, 1999. Applicants wish to prosecute Claims 10-16. Claims 10-12 have been amended to properly recite the subject matter in independent form.

Substantive examination on the merits is respectfully requested.

Respectfully submitted,



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USPTO Customer No.



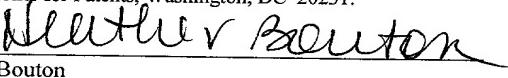
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PATENT TRADEMARK OFFICE

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I hereby certify that this paper or fee is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 CFR 1.10 on the date indicated above and is addressed to: BOX PATENT APPLICATION, Commissioner for Patents, Washington, DC 20231.


Heather Bouton

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-- When the PCB decomposition reactor having the above-described construction is operated, reaction vessel 21 is supplied with water at 250 [ata] kgf/cm² and 380°C, and also with PCB, mineral oil and sodium carbonate. Circulating pump 26 serves to agitate the reaction fluid within reaction vessel 21, and also introduce the reactant mixture 22 of water, PCB, mineral oil and sodium carbonate having a temperature of 200 to 250°C from the outside into reaction vessel 21 by mixing it with the steam of the fluid driven by circulating pump 26. This mixture 22 undergoes an exothermic reaction within reaction vessel 21 and causes sodium carbonate to precipitate. --

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On page 3, line 21 to page 4, line 10, please delete the paragraph and insert therefore the following new paragraph:

-- A circulating pump which can be used under high-pressure temperature and high-pressure conditions (e.g., at 380°C and 250 [ata] kgf/cm²) is expensive and hence raises the overall equipment cost. Since the combustion rate of oil in a liquid is high, the reactant mixture fed through the feed pipe reacts with oxygen dissolved in water and causes heat evolution in the feed pipe. If sodium carbonate alone is supplied, the sodium carbonate produced by the oxidation reaction is converted into sodium bicarbonate, resulting in a reduction in the rate of the decomposition reaction of PCB. If sodium carbonate is introduced into the reaction fluid, the solubility of oxygen is reduced and a gas phase is produced at the top of the reaction vessel. This causes a mixed gas-liquid phase to flow into the cyclone separator, resulting in a reduction in the separation efficiency of the cyclone separator. --

On page 7, line 25 to page 8, line 16, please delete the paragraph and insert therefore the following new paragraph:

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In the Claims:

Please cancel Claims 1-9 without prejudice.

Please amend the following claims.

10. (Amended) A PCB decomposition reactor comprising a reaction vessel for decomposing PCB therein and a feed pipe for feeding PCB and a solvent therefore to said reaction vessel, wherein an injector for injecting water and sodium hydroxide from the outside to the inside of said reaction vessel is connected to said reaction vessel, and said feed pipe is connected to the flow path between the connected end of said injector and the suction port of said injector for supplying water and sodium hydroxide therethrough, **[A PCB decomposition reactor as claimed in claim 9]** wherein a nozzle for introducing air in order to agitate the reaction fluid within said reaction vessel is connected to the bottom of said reaction vessel.

11. (Amended) A PCB decomposition reactor comprising a reaction vessel for decomposing PCB therein and a feed pipe for feeding PCB and a solvent therefore to said reaction vessel, wherein an injector for injecting water and sodium hydroxide from the outside to the inside of said reaction vessel is connected to said reaction vessel, and said feed pipe is connected to the flow path between the connected end of said injector and the suction port of said injector for supplying water and sodium hydroxide therethrough, **[A PCB decomposition reactor as claimed in claim 9]** wherein a nozzle for introducing oxygen in order to agitate the reaction fluid within said reaction vessel is connected to the bottom of said reaction vessel.

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12. (Amended) A PCB decomposition reactor comprising a reaction vessel for decomposing PCB therein and a feed pipe for feeding PCB and a solvent therefore to said reaction vessel, wherein an injector for injecting water and sodium hydroxide from the outside to the inside of said reaction vessel is connected to said reaction vessel, and said feed pipe is connected to the flow path between the connected end of said injector and the suction port of said injector for supplying water and sodium hydroxide therethrough,
[A PCB decomposition reactor as claimed in claim 9] wherein a nozzle for introducing air and oxygen in order to agitate the reaction fluid within said reaction vessel is connected to the bottom of said reaction vessel.